PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AMS.P52304WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB 03/04499	International filing date *(day/month/year)* 13.10.2003	Priority date *(day/month/year)* 11.10.2002
International Patent Classification (IPC) or both national classification and IPC G01V1/38		
Applicant WESTERNGECO SEISMIC HOLDINGS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the International application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
15.04.2004	13.12.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Schneiderbauer, K Telephone No. +49 89 2399-7613

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/04499

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-15 as originally filed

Claims, Numbers

1-43 received on 22.11.2004 with letter of 16.11.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

   see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1,19
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-43
Industrial applicability (IA)	Yes:	Claims	1-43
	No:	Claims	

2. Citations and explanations

   see separate sheet

1.) Reference is made to the following documents:

D1: WO 84/03153 A (KONGSBERG VAPENFAB AS) 16 August 1984 (1984-08-16)
D2: GB-A-2 089 043 (CHEVRON RES) 16 June 1982 (1982-06-16)
D3: COURT I.N.: "Applications of accoustics to source-array and streamer tow-point positioning" GEOPHYSICS, SOCIETY OF EXPLORATION GEOPHYSICISTS; vol. 56, no. 4, 1 April 1991 (1991-04-01), pages 558-564, XP002268338
D4: US-A-4 641 287 (NEELEY WALTER P) 3 February 1987 (1987-02-03)
D5: US-A-4 187 492 (DELIGNIERES ROBERT) 5 February 1980 (1980-02-05)
D6: US-A-4 376 301 (ROBERTS F ALEX) 8 March 1983 (1983-03-08)

2.) Technical field: marine seismics

3.) The amendments as filed with letter from 16-11-04 go beyond the disclosure of the original application, the reasons being the following:
Independent claims 1 and 19 mention the determination of the depth of each seismic sensor. The description only discloses the determination of the "position" of the seismic sensors, it does not mention the determination of the depth. "Position" can also be the lateral position (x- and y-direction) without including the z-direction (depth). The use of three sources (embodiment of fig. 1B) cannot be considered as indicating the determination of depth: a plurality of sources can be used to improve the accuracy of position determination and to determine the position of the seismic sensors within a reasonable range of positions (s. description, page 9, lines 4-9).

The report will therefore be established as if the amendment "determination of depth" had not been made (Art. 34(2)(b) and Rule 70.2.(c) PCT).

4.) Novelty (Art.33(1),(2) PCT) and inventive step (Art.33(1),(3) PCT) of the independent claims 1 and 19:
D1 and D6 each disclose an apparatus comprising:
- at least one seismic sensor (D1: hydrophones on cable 2 in fig.1; D6: hydrophones 20)
- a plurality of sources (adapted to be) deployed in a manner structurally independent of the seismic sensors (D1: signal generators 6 on steel wire; fig.1; page 7, 2nd paragr.; D6: acoustic sources 28,30)
- and adapted to provide a positioning signal (D1: page 7, 2nd paragr.; D6: col.3, li.14;

high frequency signal) for the determination of the position of each seismic sensor which is distinguishable from a seismic survey signal (D1: page 8, 2nd paragr.; D6: col.3, li.14-30) to the seismic sensor; in D1 the signal which is sent from the transducers to the hydrophones is distinguishable from "normal" seismic signals in terms of 1.) time (D1; page 7, lines 12-19) and in terms of 2.) frequencies (D1; page 8, li. 10-15). In D6 "high frequency sources" (D6; col.3, li.14) are used. Their positioning signals are therefore intrinsically distinguishable from seismic signals.

5.) Dependent claims:

5.1) The subject-matters of dependent claims 31, 34 and 40 are not considered to be inventive. These claims disclose apparatus/systems with sources deployed on buoys (claim 31), on a boom (claim 34) or on a second vessel (claim 40) on the one hand, and, on the other hand, at least one source deployed on the (first) vessel. The deployment of sources on buoys and booms is known from D1 (D1; page 7, last paragr.; page 8, first and 3rd paragr.; fig.1, 2) . The deployment of at least one source (for the purpose of position determination) on a second vessel is known from D4 (D4; fig.1, ref.36, 38). The subject-matters of these claims differ from the prior art only by the fact that other sources are additionally deployed on a first vessel in order to provide additional source locations which can be used in the further processing. However, D3 employs sources on a vessel (D3; fig.1; transducers 0 and 8) in addition to other sources (D3; transducers 7 and 8) which are not deployed on the vessel in order to provide a plurality of measurements which are used for the position determination of streamers. The transducers are tuneable with operational frequencies between 50 and 100 kHz, well above the frequencies containing seismic data (D3; page 559, right column, 2nd an 3rd paragr.).

5.2) The present application does not meet the requirements of **Article 33(1),(3) PCT**, because the subject-matter of dependent claim 36 does not involve an inventive step. Claim 36 differs from D1 only by the fact that the buoys are self-propelled. Self propelled buoys which are used in sea seismics are known and do not constitute an inventive contribution. The subject-matter of claim 36 is therefore not inventive.

5.3) The features of dependent claims 2-18, 20-30, 32, 33, 35, 37-39 and 41-43 appear to be a matter of normal design procedure in order to carry out the determination of

positions at sea; and which therefore do not involve an inventive step (**Art.33(1),(3) PCT**).

6.) Industrial applicability (Art.33(1),(4) PCT):
Beyond any doubt the invention, as defined in claims 1-43, is industrially applicable.